



Semantic Technologies Foundation Initiative for Systems Engineering.

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This work is partially founded by the California Institute of Technology



Background

- The idea of establishing a Semantic Technology Foundation for Systems Engineering originated at the 3rd JPL/NASA Model-Based System Engineering Symposium and Workshop in January, 2017
 - It is generally recognized that common standards for SE ontologies are necessary in order to achieve digital engineering transformation
- Dinesh Verma, SERC Executive Director, and Chi Lin, JPL Engineering Development Office Manager, organized a brainstorming session hosted @JPL with a small group of people (the initial working group)
 - Objective of the meeting and follow-on telecons was to identify key steps and criteria for establishing a Semantic Technology Foundation for Systems Engineering

Semantic Technologies Foundation Initiative for Systems Engineering

Charter

The Semantic Technologies Foundation Initiative for Systems Engineering is to promote and champion the development and utilization of ontologies and semantic technologies to support system engineering practice, education, and research.

Mission

The mission of the initiative is to collect a suite of interoperable ontologies that are logically well-formed and accurate from both scientific and engineering points of view. The initiative will charter a collective of stakeholders that are committed to collaboration and adherence to shared semantic principles for the advancement of systems engineering. To achieve this, initiative working group participants will voluntarily adhere to and contribute to the development of an evolving set of principles including open use, collaborative development, and non-overlapping and appropriately-scoped content. They will capture and maintain metadata for each ontology to encourage implementation and reuse.

Specifically, The Foundation Will

- Work to build consensus around principled, rigorous use of systems engineering language
 - Not just capturing current usage, but proposing normalized usage that entails semantic rigor
- Capture and formalize this consensus in formal ontologies using well-established languages and techniques from Knowledge Representation
- Collect and promulgate methodological guidance for development of related ontologies from industry and academia
- Collect and encourage development of related software to support semantic model-building, reasoning, and analysis
- Provide advocacy and training for more rigorous practice supporting these artifacts and tools

Candidate Governance Structure

Steering Group
(4 to 6 members)

- Steering Group own the initiative charter and ensures that activities adhere to it; provides programmatic guidance

Working Groups
(unlimited)

- Working Groups are formed for specific projects; many will originate in proposed contributions from core team members or others

Core Team
(8 to 10 members)

- Core Team ensures architectural coherence; provides technical guidance in both SE and Semantic technology

Requirements and Expectations

- Core Team
 - Has working knowledge of theory and practices of semantic technology including ontology development
 - Possess working knowledge of theory and practices of systems engineering
 - Develop common (or upper level) ontologies that apply to all applications (e.g. space, automotive)
 - Be able to support 4-8 hours per week of effort
 - Collect ontology exemplars (e.g., NASA JPL – IMCE Ontologies, CUBRC – CCO Ontologies)
 - If applicable, obtain support from their home organization, or professional society for sponsorship

Requirements and Expectations

- Working Group
 - Has working knowledge of theory and practices of semantic technologies including ontology development in their domain
 - Will be solicited by Core Team for specific tasks
 - If applicable, obtain support from their home organization
- Steering Group
 - Solicit sponsors and provide necessary funding support
 - E.g., travel funds, on-line collaboration tools (WebEx, Blue Jeans, etc.), Semantic Tools (Top Braid, Protégé, etc.), on-line collaborative repository for working space (GitHub)
 - Has a leadership position and/or influence in an organization
 - Oversee and provide programmatic guidance for core team and working groups
 - In charge of roadmap and professional societies engagement such as IEEE, INCOSE
 - Hold face-to-face meetings

The Roadmap

- Establish charter and mission objectives
- Conduct survey on similar foundations
- Define operational and governance structures and respective roles and responsibilities for three groups
 - Identify and select core team and steering group member; working group(s) will be formed on an as needed basis
- Investigate and establish an initial set of requirements and implement the foundation per these requirements
- Socialize the foundations concept
 - INCOSE, IEEE

Initial Core team members

- Steve Jenkins Jet Propulsion Lab
- David Long INCOSE Past President and Vetch President
- Mark Blackburn SECR Council Member
- Todd Schneider Engineering Semantics
- Chris Paredis Georgia Institute of Technology
- Ken Laskey MITRE
- Hans-Peter De Koning European Space Agency
- Bill Schindel NCOSE Modeling Pattern Working Group
- Barry Smith (Consultant) Director, National Center for Ontological Research

Initiative Contributors

- Dinesh Verma SERC Executive Director & Prof. Stevens Institute of Technology
- Chi Lin JPL IMCE Program Manager & Engineering Development Office Manager
- Steve Jenkins JPL IMCE Chief Engineer
- David Long INCOSE Former President & Vetch President
- Mary Bone Stevens Institute Technology Professor
- Mark Blackburn SERC Council Member
- Scott Lucero DASDSE Deputy Director, Strategic Initiatives
- Todd Schneider Engineering Semantics
- Barry Smith Director, National Center for Ontological Research
- Troy Peterson INCOSE Transition Program Lead
- Martin Kittrell DoD Engineered Resilient Systems
- George Ball Raytheon, Information Ecologist, IT Fellow,
- Megan Clifford SERC Chief of Staff and Program Operations